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Adaptation of Subject-Matter and Instruction to Individual Differences in the Elementary School

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PREFATORY NOTE

Mr. Orata's early education was in the schools of the Philippine Islands and hence he approaches problems relative to education with a unique background. For this reason his discussion of the "adaptation of subject-matter and instruction to individual differences in the elementary school" should be especially interesting.

The manuscript for this circular was originally prepared as a term paper in a graduate course in the Department of Education. It was revised by Mr. Orata and then edited for publication by members of the staff of the Bureau of Educational Research.

WALTER S. MONROE, *Director*,
Bureau of Educational Research.

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ADAPTATION OF SUBJECT-MATTER AND INSTRUCTION TO INDIVIDUAL DIFFERENCES IN THE ELEMENTARY SCHOOL

The problem. The development of education in the last two decades has brought with it several changes in aims, ideals and methods of educational endeavor. One of these changes is a tendency on the part of a great many teachers and administrators to replace the present group or simultaneous instruction with a system of individual instruction or with a highly systematized homogeneous grouping for purposes of adapting subject-matter and instruction to differences in interests and capacities of school children. The scope of this study is limited to a consideration of the problem of adaptation of content and of method to individual differences in the elementary school in so far as it relates to the teacher.

More definitely, the author proposes to answer the following questions, which inevitably arise as one attempts to consider the solution of this general problem.

I. What evidences do we have, and to what extent are they valid, which lead us to believe that it is necessary to adapt subject-matter and instruction to differences in interests and capacities of school children?

II. What is the nature of the differences which we find in elementary school children?

III. What are some of the devices and methods to which a teacher may resort in order to meet these individual differences?

IV. What criteria should guide a teacher in selecting and in using a particular method or device so that the outcomes of learning and teaching may be in agreement with the ultimate aims of education?

The first and second of these questions may be answered by presenting factual evidence, which is abundant in educational literature. The answer to the third requires the canvas of current discussions of adaptation of instruction to individual differences in order to collect possible devices and methods. The fourth question, which appears to be most important and fundamental, takes us into the fields of educational theory and practice. Assuming that differences in capacities and interests of elementary school children exist, and that several methods and devices may be used in adapting subject-matter and instruction, we can determine whether we are producing the right kind of output in the way of habits, skills, ideals and attitudes only by applying our ultimate educational objectives as criteria.

Factors that led to an interest in adaptation to individual differences. There are at least three factors that are responsible for the development of the interest in the consideration of individual differences in the process of instruction. First, the science of psychology has revealed the fact that there are very wide differences among individual pupils in their capacity to learn; that these differences tend to be general so that one who is above the average in solving algebraic problems is very likely to be above the average in memorizing poetry, in learning geography, and the like; and that these differences usually persist throughout life so that one who is bright or dull in the primary grades, will, other things being equal, be bright or dull in high school and in college. Educational psychology, consequently, has led the way to recognizing the child as the central factor in the teaching process. The second factor contributing to the movement is the wide-spread use of tests for measuring achievement and intelligence. Such tests furnish objective data as to the amount and extent of individual differences. The third and final factor, partly a result of the first two, is the extension of the meaning of democracy in our schools. The former ideal of "equal education for all," has been changed to "equal opportunity for education for all," meaning not only that equal chances for going to school should be extended to all, but also that further opportunity should be given each pupil to advance in his studies according to his own rate.

Individual instruction not a new idea. Up to the nineteenth century, the prevailing method of instruction was individual. Each pupil advanced to the teacher's desk when his turn came, recited upon the work that he had prepared, received a new assignment, and returned to his seat. The writer had the lot of being instructed in the "kindergarten" under Philippine teachers. The curriculum consisted of the three R's and some advanced courses in grammar, geography and arithmetic, and the method of instruction was largely individual. So far as the writer can remember, this method succeeded in as much as the task involved either training in skill in manipulation, as in arithmetic and handwriting, or memorizing, as in the case of grammar, geography, and the like. The aim of education at that time was merely so many facts memorized, so many words in Spanish translated, so much multiplication or division done, and so many prayers learned and recited.

Simultaneous instruction adopted during nineteenth century. The growing complexity of social organization, together with other factors resulting from the development of institutional life, brought with it several changes in our conception of education. First of all, universal

primary education made the school enrollment larger than could be taken care of by the number of teachers employed under the system of individual instruction, and the state could not afford to hire many more teachers than were under employment. Secondly, the extension of the curriculum tended to increase the load of the instructional staff. The third, and perhaps the most important factor, and one that developed near the close of the century, was the change in the ideal and aim of education as a result of the development of the science of sociology. Whereas, under the system of individual instruction, the aim of education had been the development of each child independent of that of the other pupils in the class, educational sociology and social psychology proposed and insisted that the child must be developed as a result of its association with other children.

Social point of view advocated by educational writers. John Dewey clearly expresses in all his educational writings his belief in the school as a social institution. This fact is shown especially in his article "My Pedagogic Creed" from which the following quotation is selected. "I believe that the school is primarily a social institution. Education being a social process, the school is simply the form of community life in which all these agencies are concentrated that will be most effective in bringing the child to share in the inherited resources of the race, and to use his powers for social ends. I believe that education, therefore, is a process of living and not a preparation for future living."¹

W. R. Smith in an extended quotation on the same topic says in part, "The individual must not only possess a sound mind in a sound body, and come into the spiritual inheritance of the race to be fully educated, but he must be brought into active and harmonious relations with his environment. The individual must not only be personally efficient; he must be socially efficient. Individual development without training for social service may not only be useless, but pernicious as well."²

Even W. T. Harris who made a rather severe attack on simultaneous instruction and who was an outstanding advocate of adaptation of subject-matter and instruction to individual differences in capacities and aptitudes of school children, said in part, "But no philosophy of educa-

¹Quoted without specific reference by: SMITH, W. R. *An Introduction to Educational Sociology*. Boston: Houghton Mifflin Company, 1917.

²SMITH, W. R. *An Introduction to Educational Sociology*. Boston: Houghton Mifflin Company, 1917, p. 12-13.

tion is fundamental until it is based upon sociology—not on physiology, not even on psychology, but on sociology.”³

Early criticisms of the simultaneous instruction. As a result of the enthusiastic tendency to deal with groups instead of individuals as units in the teaching and learning process, an extreme class or group instruction prevailed. The teacher tended to deal alike with all children irrespective of the variations in their capacities and interests. W. T. Harris, Commissioner of Education in the United States from 1899 to 1906, was the first to call attention to the dangers of the extreme type of simultaneous instruction. He appreciated the advantages as well as the defects of group instruction, and called attention to both in an article under the caption “The Early Withdrawal of Pupils from Schools” printed in the Proceedings of the National Education Association for 1872. Among the advantages he cited were: increase in the length of recitation for each pupil, since each has as much time as his group; more thoroughness in the discussion of the lesson, sifting the different statements and probing the meaning of each; greater stimulation of mental activity of the pupil through trial and competition with other members of the class.⁴

He gave the following disadvantages of the system: the best pupils are not tried to the extent of their ability and at the same time the poorer pupils “are strained to their utmost,” and as a result frequently become discouraged and drop out of school altogether.

Perhaps the most vehement critic of the simultaneous method of instruction during the late part of the nineteenth century was P. W. Search. In a book entitled “An Ideal School,”⁵ he described experiments to provide for individual differences in capacity and interests which had been undertaken in school systems of which he was the superintendent. He characterized the existing method as the “lockstep in American education,” thus tending to attach to the simultaneous method “the odium of prison practice.”

I. Evidence of wide differences in the school population. The criticisms of simultaneous instruction given by the earlier writers were based entirely upon observation. It was not until the first decade of

³HARRIS, W. T. “Reviews (Froebel and education by self-activity),” *Educational Review*, 6:84, June, 1893.

⁴HARRIS, W. T. “The early withdrawal of pupils from schools: Its causes and its remedies.” *Addresses and Proceedings of the National Education Association*, Vol. 12. Washington: National Education Association, 1872, p. 266-71.

⁵SEARCH, P. W. *An Ideal School*. New York: D. Appleton and Company, 1901, p. 28-37; 158-76.

the twentieth century that scientific data were secured which gave light as to the nature and extent of the differences existing among school children. Thorndike,⁶ Ayres,⁷ and others are the pioneers in scientific education and have demonstrated objectively the presence of individual differences. They insist that for the school to perform its function properly these differences must be taken into consideration. In his *Educational Psychology*, published by Teachers College in 1903, and revised in 1910, Thorndike has chapters which demonstrate clearly on a statistical basis just how great the amount of these differences is between the fastest and the slowest members of an ordinary class. The following general statement is made in his *Principles of Teaching*:

"Roughly speaking, the teacher of a class, even in school, graded as closely as is possible in large cities, where two classes are provided in each building for each grade and where promotion occurs every six months, will find in the case of any kind of work some pupil who can do from two to five times as much in the same time, or do the same amount from two to five times as well, as some other pupil. The highest tenth of her class will in any one trait have an average ability from one and three fourths to four times that of the lowest tenth."

Without going into an extensive discussion of differences in capacity for learning school subjects, the overlapping of intelligence which is typical of school children in various grades is shown in the following diagram. Figure 1 represents graphically the distribution of mental ages as measured by the Illinois General Intelligence Test. Each of the curves is based upon the records of several thousand children. In each grade the range in mental age is striking; there are some pupils in the fourth grade who are superior in capacity to learn to a number of children in the eighth grade. The fact that these differences in capacity for learning school subjects exist between children everywhere is the most powerful argument in favor of adaptation of subject-matter and instruction.

II. Nature and pedagogical significance of individual differences.

In order to understand individual differences so that remedial treatment in the way of devices and of methods may be provided in our schools, we must study their nature and the conditioning factors that bring them about.

⁶E. L. Thorndike (born 1874), for a quarter of a century Professor of Educational Psychology in Teachers College, Columbia University, has probably done more than any other person to promote the scientific study of educational problems.

⁷L. P. Ayres (born 1879), in his *Laggards in Our Schools* published in 1909, was the first to conduct an extensive investigation on retardation and elimination of pupils from schools.

1. Differences in home environment. Some of our pupils come from homes that provide all the conveniences favorable to pleasant and quiet study, such as good warm study rooms, good lighting, plenty of good books and magazines to read during leisure hours, and the like. The parents usually are educated and their influence is apparent in the

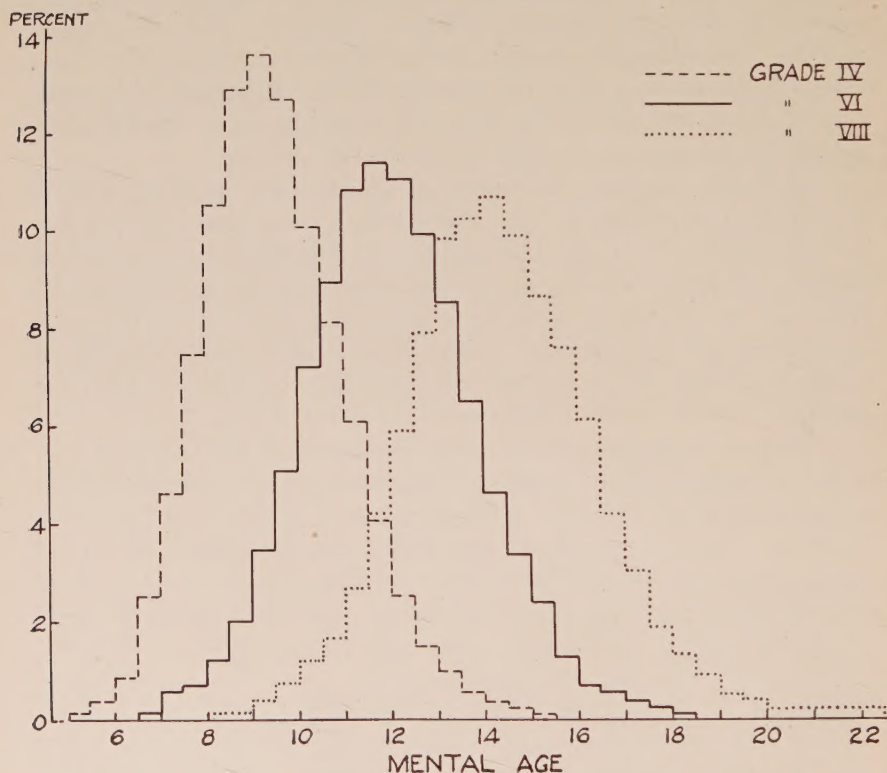


FIG. 1.—Showing the overlapping of intelligence of Illinois school children in Grades IV, VI, and VIII.*

*Monroe, Walter S. "The Illinois Examination." University of Illinois Bulletin, Vol. 19, No. 9, Bureau of Educational Research Bulletin No. 6. Urbana: University of Illinois, October, 1921, p. 51.

differences of behavior which their children exhibit in and outside of the school. The occupational interests of these parents, likewise, influence to no small a degree the interests of their children.

On the other hand, many children come from the slums of the city, from poor families where the environment is anything but favor-

able to the cultivation of wholesome interests and of moral and spiritual character. The homes are not warm and comfortable for study. The parents, because of the stress of work in which they are necessarily engaged for the support of the family, are apt to neglect their children, thus leaving them to the mercy of moral degeneracy. The children from these poor families are often ill-fed, ill-sheltered and ill-clothed.

2. Differences in interests and attitudes. In the preceding paragraph, the statement was made that occupational interests of the parents influence the interests of the children. For instance, a child who is reared on a farm is likely to be interested in agriculture; another child who has been brought up in a manufacturing district is likely to have his interests in industrial work. Interests also are engendered by stories in the magazines and newspapers, by the theatre, and so on. Again, there are native interests which are likely to continue unless a serious attempt to modify them is begun in early life.

3. Differences in health. Some children are weak while others are strong and healthy. This difference in physical condition is either inherited or acquired. The teacher in a class can suggest treatment, or she can advise the pupils of poor health to consult a doctor. In either case, she can vary the assignment so as to give less work to the pupils who are not strong. She may also consult the parents and at times have the pupil stay away from school for a while. If the poor health is due to ill-feeding and ill-shelter, suggestions may be made to the parents, or in some cases assistance may be given by the school.

4. Differences in capacity to learn, general and specific. As indicated on pages 7-8, measurements of general intelligence have revealed the fact that there are wide differences among children in their capacity to learn. Besides these differences in general intelligence there exist variations in their capacities to learn different school subjects. For example, according to certain investigations, most girls like subjects such as language, history, and art, and dislike mathematics and science. The boys seem to be of another type, that is, they like mathematics and science but they have no "taste" for language, history, and art. Among boys and among girls, such differences also are found. Whether "types" really exist, is not as yet a well-established fact. Thorndike, for example, denies, while Stern believes in, the existence of types. Although the presence or absence of "types" makes a great difference in our educational procedure, our present knowledge of the subject is not adequate to justify our assumption that there are or are not types. It is

sufficient to suggest to the teacher that she try to understand these apparent differences in capacity and ascertain for herself whether or not they exist because of a lack of understanding of the subject-matter or because of an original inaptitude toward it.

5. Differences in temperaments. Individuals may be graded with respect to speed, vigor, and range of their mental processes on scales of quick to slow, intense to weak, and broad to narrow. Some children can do only one thing at a time while others can do more, or at least they think they can do more. Some are slow and accurate thinkers while others are fast and careless. Some children are persistent and tenacious in their efforts to do assigned tasks; others give up easily.

III. Methods and devices for adapting subject-matter and instruction to individual differences in the elementary school. As we have noted, our problem is limited to those adaptations of subject-matter and instruction which the teacher may make. Six general procedures will be noted.

1. Supplementary assignments to proficient pupils. One of the strongest arguments advanced in support of individual instruction or of highly homogeneous grouping is that, in group instruction, the more capable pupils are allowed to mark time, they are not given the opportunity to advance according to their own rate, and they are, therefore, retarded while the slower ones are accelerated. In answer to this argument, the supporter of simultaneous instruction would provide the more proficient pupils with supplementary assignments, thus giving them not only a more extensive but also a more intensive training in any subject in which they show marked superiority over the other members of the class. According to this plan, although the proficient pupils do not advance more rapidly than the slower ones, they nevertheless get better training in that their knowledge of the subject-matter is more thorough and extensive. An added advantage is that the virtues of group instruction are kept and the evils of individual instruction avoided.

An illustration of the plan described in the preceding paragraph is taken from an article by S. C. Parker⁸ in which he gives an account of the method used by Miss Stout in the first grade. Miss Stout had a system of grouping and regrouping her first-grade pupils in reading in order to provide for differences in ability to learn. She picked out the four or five pupils who could read faster than the rest of the class. After

⁸PARKER, S. C. "Adapting instruction to differences in capacity," *Elementary School Journal*, 25:21, October, 1924.

these pupils had done the regular work, they were sent to the black-board where more difficult material awaited them, or they were given a supplementary reader to read to themselves. Later they were asked to read to the teacher in order to be sure that they had mastered the mechanics of reading. They were also encouraged to take readers home to read to their mothers, and to bring to class their own material which they exchanged with other pupils. In arithmetic she provided sets of graded number cards in the four fundamental processes, the sets becoming harder and harder. Each pupil progressed as fast as he could, and when he got through with the required material was given some that was more difficult. Each pupil's handwork was praised and preserved and more difficult models were requested. Promotions to a higher division also were made from time to time. The bright pupils were sent to the next grade on trial for a number of days, and if they were able to handle the work of the grade they remained, otherwise they returned to her for further instruction.

It is clear in the above illustration that differences of children in capacity to learn need not lead to individual instruction because the brighter pupils can be given extra assignments and may be promoted to the higher grades as soon as they master the subject. They are not left to mark time, the slower ones are not accelerated, and at the same time the virtues of group instruction are retained. It would seem that if Miss Stout can do this sort of thing in the first grade, the same method with perhaps little modification can be applied in the other grades.

2. Special periods for remedial instruction. In connection with the supplementary assignment, there may be provision for special periods for remedial instruction in which the teacher may devote most of her time to aiding and directing the slower pupils in their studies. In the meantime the brighter pupils may be engaged in the study of supplementary assignments such as solving problems, reading of various sorts, drawing, and the like. Special periods may be arranged regularly during the year, or assigned at irregular intervals where they seem needed by the teacher in charge. The recitation, however, must not be neglected as the essential part of the work.

In the University of Chicago Elementary School⁹ there is a separate department called the "remedial department" which takes care of

⁹University of Chicago Elementary School Reports, Vol. V, Parts I, VI and X, 1923.

The author expresses his indebtedness to Mr. Cook of the School of Education both for giving permission to read the reports and for allowing him two personal conferences about the organization and technique of the remedial department.

“problem cases,”—individual pupils who are distinctly backward in their school work. This department is in charge of specialists who diagnose the separate cases and provide for remedial treatment. The plan for diagnosis is both elaborate and technical. In most school systems, however, there are no remedial departments and no specialists to handle problem cases. The teacher, however, can do much in the way of diagnosing individual cases and of providing exercises to remove deficiencies. In reading for instance, she can detect cases of defects in the mechanics and can devise remedial exercises. The same is true in arithmetic, writing, spelling and in other subjects. This plan, in order to be successful, calls for ingenuity on the part of the teacher.

3. Free work-and-play periods. A somewhat different type of adaptation for individual differences is afforded by making provision for free work-and-play periods. On these occasions the pupils may be allowed to work upon projects which they themselves suggest, provided the activity meets the approval of the teacher. When pupils have no satisfactory plans, the teacher may make suggestions and help them to select some project or even game having educative value. The success of free work-and-play periods depends largely upon the resourcefulness of the teacher and for this reason she should observe the pupils both in and out of the classroom and endeavor to become acquainted with their interests and attitudes so that in the classroom she can make provision for these differences in the way of devices, methods and motivation.

4. Highly systematized individual instruction. The Dalton Plan¹⁰ and the Winnetka Plan,¹¹ although they are dependent upon the general organization of the school, are the outstanding plans of individual instruction which may be employed by the teacher. The essential features of both plans and of some others which are modifications of them include the very careful preparation of sets of tasks or “problems” to be worked out by the pupils independently. Each pupil works these “problems” at his own rate, and is allowed to advance to the next division as soon as he passes a satisfactory examination, usually a standardized test. In some cases, promotions to the higher grades are made as soon as the work is completed; in others, extra assignments are given those pupils who finish the work before the semester or quarter is over. The teacher devotes her time to supervising and directing the study, especially of those who need help.

¹⁰, ¹¹BAGLEY, W. C. and KEITH, J. A. H. *An Introduction to Teaching*. New York: The Macmillan Company, 1924, p. 199.

5. Homogeneous grouping of pupils within a class. As in the preceding plan, the homogeneous grouping of pupils is dependent partly upon the administration. However, the teacher of a class may do very much in the light of method and subject-matter. If she has two or three classes, she can divide them into three sections according as they are fast, average, and slow. Even in the case in which she has only one class, she may divide the class into three groups, appointing monitors among the brightest pupils, while she supervises the three simultaneously-going-on-classes in the same room.

6. "Supervised Study." There are various types of supervised study, so many that it is not at all easy to give a definition which includes all.¹² In a sense, the Dalton and Winnetka plans are supervised-study plans. According to some plans, the teacher has great freedom in using the class recitation as she sees fit; in some cases half of the period is devoted to supervised study and the other half to recitation; in others the whole period on one day is used for supervised study and on the next day for recitation. The proficient pupils may be, and are usually, given extra work while the teacher devotes her time to those who are most in need of help.

IV. Criteria for the selection of a method or a device. The final question that we have to answer is: accepting the thesis that individual differences exist and that in order to provide each pupil with the best training, subject-matter and instruction must be adapted to these differences; what kind of provisions should the teacher employ? In other words, what should be the basis of the selection of the procedures used?

In answering this question as in answering many other educational questions in school administration and methods of teaching, we need to consider the fundamental basis of all educational endeavor and to make our procedure follow a sound educational theory and philosophy. My answer then is very largely determined by my educational philosophy which has been derived in part from certain psychological and sociological facts.

If education is to be as in the past, a mere accumulation of knowledge, a mere acquisition of skill, "if it is mainly a matter of rote drill, if it touches no enthusiasm, and arouses no deep-seated sympathies, and no development of the humane, tolerant, broadly sympathetic temper of

¹²BROWNELL, W. A. "A study of supervised study." University of Illinois Bulletin, Vol. 22, No. 41, Bureau of Educational Research Bulletin No. 26. Urbana: University of Illinois, 1925. 48 p.

mind which we call democratic attitude,"¹³ then extreme individual instruction and homogeneous grouping of pupils for purposes of instruction will be the most practical and the most efficient method. If, on the other hand, education is to be interpreted as being an agency in facilitating understanding and appreciation of all human interests, it is necessary that things be taught in their "social context," that is, they must illuminate human life in general.

It is apparent that such illumination of life is only possible when individuals are grouped so that they realize that they are a company of learners, working and cooperating for a common welfare, each contributing his share and each getting from the contribution of others something which, when added to his own, will make him a man or woman rich in sympathy, strong in tendency to cooperate with his fellows, and ready to take his share without feeling a stranger when he gets out of school to participate in the life of the community. The school therefore must provide a social environment which will be conducive to the engendering of all these qualities. Obviously, such qualities will not be acquired efficiently in the extreme type of individual instruction in which the child is confined in his own cell, learning his book in his own way and receiving instruction from the teacher. Intercommunication and cooperation in the school are necessary for the building up of common-mindedness and "community of interests." At best the school is an artificial institution. Why should it be made more artificial and even useless and injurious in the sense that it becomes a hindrance rather than an agency for the cultivation of right social habits?

The writer's attitude on this subject, as is already stated, is far from being opposed entirely to making any provisions for individual differences. He is rather endeavoring to combat the tendency of many schoolmen to abolish group instruction and to establish either the extreme type of individual instruction or else to divide the pupils in grades according to their abilities. He is insisting on giving every child every opportunity to acquire knowledge without, however, surrendering the other phase of human development, namely, the virtue that comes out of group life. In other words, he holds that education is the development of self in two directions which must be supplementary instead of opposed to each other. There is the development of the individual by his acquisition of skill and knowledge as such, but there is another development of the self, the engendering of broad human sympathies, group-mindedness and moral and social values which can only be ac-

¹³BODE, B. H. *Fundamentals of Education*. New York: The Macmillan Company, 1922, p. 63.

quired under group instruction. Man is both an individual and a social being. Individual instruction in a sense must be directed toward a more efficient social relationship. Consequently, the best method is that of adaptation of subject-matter and instruction to individual differences which goes along with group instruction.

More concretely and specifically, it is recommended that a scheme, such as has been described on pages 10-11, or supplementary assignments to proficient pupils with special periods for remedial instruction be adopted. This procedure fulfills to my mind the social as well as the individual aim of education.

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